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Description

[Khan Orotracheal Suction System]

BACKGROUND OF INVENTION

[0001] Every year thousands of patients in the United States die from acute airway obstruction. Tens of thousands of others die or suffer significant morbidity from the after affects of improper suctioning early; including aspiration pneumonia, empyema, and Acute Respiratory Distress Syndrome (ARDS). In June of 2003, I treated a patient who had aspirated twice at a large Level I trauma center. He sustained a sub-arachnoid hemorrhage from blunt trauma. There were no good oral suction catheters with large lumens that could adequately suction large food particles in his mouth and trachea. He had eaten a large Chinese food meal, and had spongy seafood material lodged in his trachea, thereby obstructing it. It was very difficult to ventilate him, because some air could be inspired around the spongy material, but very little air could be expired out, since the food was acting like a one way valve. The suction catheters available did not have large

enough lumens to suck out the foreign material and other commercial suction catheters that we tried did not have a good enough air seal deep in the trachea to suck these major food particles out. In addition to foreign bodies our system can be used for acute airway obstruction from mucous plugging which causes significant morbidity and mortality in patients with asthma and chronic obstructive pulmonary disease in emergency department and intensive care unit (ICU) settings. These patients also have difficulty ventilating on and off ventilators and consequences of these obstructions are frequently lethal.

[0002]

Summary of Invention

[0003] This invention is an orotracheal suction system which can be used in acute airway obstruction from foreign bodies, mucous plugging and for agressive suctioning of the trachea and bronchi after aspiration to help prevent aspiration pneumonia, empyema, and ARDS. The system can also be used for agressive suctioning of the oropharynx when large particles are present.

[0004] Even flexible bronchoscopy was tried, by a surgeon, in the emergency department on this patient under direct visual-

ization, but it, unfortunately did not work. Again there was no distal seal for suctioning and the lumen of the suction apparatus was too small.

Brief Description of Drawings

[0005] Figure 1 below shows the system assembled with its key components

Detailed Description

[0006] The invention is an Emergent Orotracheal Suction System that could be attached to wall suction and have these key components. (1st component) A reservoir, measuring 2000cc 20cmX10cmx10cm, which on one end is attached to wall suction with standard sump tubing, and the other end is attached to our standardized extension tubing which measures 15French (Fr) in diameter. On the top of the 20cmx10cm surface of the reservoir, there is a 2 cm diameter tapering "male" entry port which is centered at 5cm and 5cm from the edge. The exit is protected by a grid which measures 2mmx2mm over the opening which prevents obstruction of the vacuum by large particles. The reservoir would also be halved on the inside by a 4mmx4mm plastic grid, which would keep large particles preferentially on the entry side of the reservoir. On the

bottom of the entry side is a 5cm diameter removable disc to empty particle contents on the entry side and evacuate fluid from the entire reservoir, and to clean it. The opposite hole is a 15Fr diameter "female" entry port which accepts the 15 Fr extension tubing via an adaptor which importantly keeps the entry to the reservoir 15Fr and is centered at 5cm and 5cm from the center edge of that side. (2nd component) The 15 Fr extension tubing should measure 3ft-5ft to allow enough slack to reach a patient's head on the stretcher. The extension tubing can then be attached via an adapter to our orotracheal suction catheters. Different adapters would accompany each suction catheter size. One side of the adapter would always provide a seal to the 15 Fr extension tubing and the other side to the different size orotracheal suction catheters. The catheters could range in size in an adult system from 5Fr to 8Fr, in 0.5Fr increments. The pediatric catheters could range in size from0.5Fr to 5Fr, in 0.5Fr increments. The catheters work like this. They would be made of a high quality plastic polymer and have enough strength to withstand the pressure of the vacuum and flexibility to pass through. A catheter sized 0.5 Fr below the size of the endotracheal (ET) tube could be passed down the ET tube

into the trachea. A proximal balloon port which would hook up to a 10cc syringe would be on each suction catheter and could inflate a distal balloon on the catheter. The balloon would be 5mm from the end of the catheter. This would create a good seal in the trachea for suction like an ET tube creates for ventilation. If the food bolus is very proximal in the trachea our extension tubing could be attached directly to an ET tube with our adapters to suction into the reservoir. The key problems our system would solve is large enough extension tubing and suction catheters to allow adequate suctioning of larger and smaller food particles which were aspirated in the trachea or vomited into the mouth. The other advantage of the catheters is there larger size and the distal seal they can create in the trachea. Standard sump tubing and other commercially available suction catheters frequently get clogged because their lumens are too narrow for large particles, or they are applying suction in the trachea with no good air seal. These commercially available tracheal catheters do not provide a good distal seal in the trachea to allow for proper suctioning of large and small aspirated particles. This system does not an unreasonable amount of parts. The suction catheter and extension tubing can

even fit onto standard suction containers and the catheter pulled out frequently and used like a narrow commercially available suction catheter.. This system will revolutionize the treatment of aspiration and acute airway obstruction in Emergency Departments (ED) and even Intensive Care Units(ICUs), across the country and internationally.

[0007] This system will make a major impact on acute acute airway obstruction because these people cannot be suctioned effectively in the Emergency Department and frequently die. They also develop serious aspiration pneumonias and ARDS because particles are always left in the trachea from inadequate suction and eventually expire for this very reason.

[0008] Even flexible bronchoscopy was tried, by a surgeon, in the emergency department on this patient under direct visualization, but it, unfortunately did not work. Again there was no distal seal for suctioning and the lumen of the suction apparatus was too small to remove the foreign body.